THE EFFECT OF MILLING TIME ON ALUMINUM- SILICON CARBIDE COMPOSITE

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To my beloved family

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In the name of God, the most Gracious, the most Merciful.

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ABSTRACT

Silicon carbide particle reinforced aluminum matrix composites have been developed over past few decades, owing to their excellent properties like light weight, wear resistance and high elastic modulus. Thus, the silicon carbide particle reinforced aluminum matrix composites are expected to have many applications in aerospace, automobile, aircraft and electronic industries. In this study, aluminum metal matrix composites contains two weight percentages of reinforcement particles were prepared by mechanical alloying. The main steps in mechanical alloying are milling, compacting and sintering. The experiments were performed on two composition of silicon carbide powder in the composite. The study presents the results of the influence of milling time on aluminum- silicon carbide composite and the effect of different weight percentage of silicon carbide in composite on hardness and microstructure of the composite. Aluminum and silicon carbide particles are mixed of different milling times 0, 40, 80, 120 minute. Digital image analyzer was used to characterize the composites. The effect of weight percentage of silicon carbide on hardness of composites was investigated by using Vickers hardness Test. Hardness of the composites increased with increasing silicon carbide addition in it.

ABSTRAK

Matriks komposit aluminum yang diperkukuh dengan zarah silikon karbida telah dibangunkan sejak beberapa dekad lalu kerana kecemerlangan sifat-sifat seperti ringan, tahan rintang dan modulus elastik yang tinggi. Oleh itu, matriks komposit aluminum yang diperkukuh dengan zarah silikon karbida dijangka mempunyai banyak aplikasi dalam aeroangkasa, kereta, kapal terbang dan industri elektronik. Dalam kajian ini, komposit matriks logam aluminium mengandungi dua peratusan berat zarah pengukuhan telah disediakan melalui pengaloian mekanikal. Langkah-langkah utama dalam pengaloian mekanikal ialah penghancuran, mampatan dan pensinteran. Eksperimen dijalankan ke atas dua komposisi serbuk silikon karbida dalam komposit. Kajian ini membentangkan hasil pengaruh masa pengisaran terhadap komposit aluminium-silikon karbida dan kesan peratusan berat yang berbeza daripada silikon karbida dalam komposit pada kekerasan dan struktur mikro yang telah dikaji. Zarah aluminium dan silikon karbida dicampur pada masa pengisaran yang berbeza; 0, 40, 80, 120 minit. Penganalisis imej digital digunakan untuk mencirikan komposit. Kesan peratusan berat silikon karbida pada kekerasan komposit dikaji menggunakan kekerasan Ujian Vickers. Kekerasan komposit meningkat dengan peningkatan silikon karbida di dalamnya.